

IN THE CLAIMS

1. (Withdrawn) A flame retardant polymer composition comprising:  
a polymer material; and  
a polycondensation product of a plurality of monomers of an at least partially hydrolyzed, phosphinate-chelated metal oxide precursor.
2. (Withdrawn) The flame retardant polymer composition of claim 1, wherein said polymer material comprises at least one of an alkyd resin, a vinyl ester resin, a polyurethane resin, an epoxy resin, a phenol resin, an urea-aldehyde resin, a polyvinyl aromatic, a maleimide resin, a polyvinyl halide resin, a polyolefin, a polyorganosiloxane, an amino resin, a polyamide, a polyimide, a polyetherimide, a polyphenylene sulfide resin, an aromatic polysulfone, a polyamideimide, a polyesterimide, a polyesteramideimide, a polyvinyl acetal, a fluorinated polymer, and a polycarbonate.
3. (Withdrawn) The flame retardant polymer composition of claim 1, wherein each of said plurality of monomers of said at least partially hydrolyzed, phosphinate-chelated metal oxide precursor comprises at least one of a transition metal, an alkaline earth metal and a metallic element selected from the group comprising Groups 3A, 4A and 5A of the periodic table of elements.
4. (Withdrawn) The flame retardant polymer composition of claim 3, wherein each of said plurality of monomers of said at least partially hydrolyzed, phosphinate-chelated metal oxide precursor comprises at least one of aluminum, antimony, bismuth, calcium, chromium, magnesium, tin, titanium, zinc, and zirconium.

5. (Withdrawn) The flame retardant polymer composition of claim 1, further comprising at least one of a fire retardant additive, a blowing agent, a fibrous reinforcing material, a pigment, a mold release agent, a thermoplastic polymeric material, an elastomeric polymeric material, a shrink control agent, a wetting agent, an antifoam agent, a surface treatment agent, and a thickener.

6. (Withdrawn) The flame retardant polymer composition of claim 1, wherein said polycondensation product comprises nano-clusters of said monomers of said at least partially hydrolyzed phosphinate-chelated metal oxide precursor, said nano-clusters having an average diameter of about less than 100 nm.

7. (Withdrawn) The flame retardant polymer composition of claim 1, wherein each of said plurality of monomers of said at least partially hydrolyzed, phosphinate-chelated metal oxide precursor comprises an anion having the formula:



wherein R<sub>1</sub> and R<sub>2</sub> are selected from the group of moieties comprising an alkyl, an aryl, an alkoxy and an aryloxy moiety.

8. (Withdrawn) The flame retardant polymer composition of claim 1, wherein each of said plurality of monomers of said at least partially hydrolyzed, phosphinate-chelated metal oxide precursor comprises a phosphinate anion derived from phosphinic acid.

9. (Withdrawn) The flame retardant polymer composition of claim 1, wherein each of said plurality of monomers of said at least partially hydrolyzed, phosphinate-chelated metal oxide precursor comprises a diphenylphosphinate anion.

10. (Withdrawn) The flame retardant polymer composition of claim 1, wherein said polycondensation product is present in the flame retardant polymer composition in an amount in the range of about 0.1% to about 50.0% by weight of flame retardant polymer composition.

11 - 37 (Canceled)

38. (Previously Presented) A process for making a flame retardant polymer composition, the process comprising:

contacting a metal oxide precursor with a source of organophosphinate anions to form a phosphinate-chelated metal oxide precursor;

contacting said phosphinate-chelated metal oxide precursor with a polymer material;

at least partially hydrolyzing said phosphinate-chelated metal oxide precursor to form at least partially hydrolyzed phosphinate-chelated metal oxide precursor monomers;

permitting said at least partially hydrolyzed, phosphinate-chelated metal oxide precursor monomers to polycondense to form a phosphorous-containing metal oxide sol, the sol comprising a dispersed phase of nano-clusters having an average size of less than about 1000 nm; and

producing a flame retardant polymer composition comprising from about 0.1 to about 50 wt% phosphorous-containing metal oxide dispersed therein.

39. (Previously Presented) The process for making a flame retardant polymer composition of claim 38, wherein said phosphorous-containing metal oxide sol comprises a liquid and a polycondensation product of said at least partially hydrolyzed phosphinate-chelated metal oxide precursor monomers, and the process further comprises the step of removing said liquid before the step of producing.

40. (Previously Presented) The process for making a flame retardant polymer composition of claim 38, wherein said phosphorous-containing metal oxide sol comprises a liquid and a polycondensation product of said at least partially hydrolyzed phosphinate-chelated metal oxide precursor monomers, and the process further comprises the step of removing said liquid after the step of producing.

41. (Previously Presented) The process for making a flame retardant polymer composition of claim 38, wherein the step of contacting a metal oxide precursor with a source of organophosphinate anions comprises the step of selecting said metal oxide precursor from the group of metal oxide precursors consisting of a transition metal, an alkaline earth metal and a metallic element selected from Groups 3A, 4A and 5A of the periodic table of elements.

42. (Previously Presented) The process for making a flame retardant polymer composition of claim 41, wherein the step of selecting said metal oxide precursor comprises selecting said metal oxide precursor from the group of metal oxide precursors consisting of aluminum, antimony, bismuth, calcium, chromium, magnesium, tin, titanium, zinc and zirconium.

43. (Previously Presented) The process for making a flame retardant polymer composition of claim 38, the process further comprising the step of adding to said phosphorous-containing metal oxide sol at least one ingredient selected from the group consisting of a flame retardant additive, a blowing agent, a fibrous reinforcing material, a pigment, a mold release agent, a thermoplastic polymeric material, an elastomeric polymeric material, a shrink control agent, a wetting agent, an antifoam agent, a surface treatment agent, and a thickener.

44. (Previously Presented) The process for making a flame retardant polymer composition of claim 38, wherein the step of contacting a metal oxide precursor with a source of organophosphinic anions comprises the step of selecting said source of organophosphinic anions from the group consisting of materials that derive anions having the formula:



wherein R<sub>1</sub> and R<sub>2</sub> are selected from the group of moieties consisting of an alkyl, an aryl, an alkoxy and an aryloxy moiety.

45. (Original) The process for making a flame retardant polymer composition of claim 38, wherein the step of contacting a metal oxide precursor with a source of organophosphinate anions comprises the step of selecting said source of organophosphinate anions from the group comprising phosphinic acids.

46. (Original) The process for making a flame retardant polymer composition of claim 45, wherein the step of contacting a metal oxide precursor with a source of organophosphinate anions comprises contacting said metal oxide precursor with diphenylphosphinic acid.

47. (Original) The process for making a flame retardant polymer composition of claim 38, wherein the step of at least partially hydrolyzing said phosphinate-chelated metal oxide precursor comprises the step of contacting said phosphinate-chelated metal oxide precursor with a hydrolyzing agent.

48. (Original) The process for making a flame retardant polymer composition of claim 47, wherein the step of contacting said phosphinate-chelated metal oxide precursor with a hydrolyzing agent comprises contacting said phosphinate-chelated metal oxide precursor with de-ionized water.

49. (Previously Presented) The process for making a flame retardant polymer composition of claim 38, wherein the step of contacting said phosphinate-chelated metal oxide precursor with a polymer material comprises contacting said phosphinate-chelated metal oxide precursor with a polymer material selected from the group consisting of an alkyd resin, a vinyl ester resin, a polyurethane resin, an epoxy resin, a phenol resin, an urea-aldehyde resin, a polyvinyl aromatic, a malcimine resin, a polyvinyl halide resin, a polyolefin, a polyorganosiloxane, an amino resin, a polyamide, a polyimide, a polyetherimide, a polyphenylene sulfide resin, an aromatic polysulfone, a polyamideimide, a polyesterimide, a polyesteramideimide, a polyvinyl acetal, a fluorinated polymer, and a polycarbonate.

50. (Original) The process for making a flame retardant polymer composition of claim 38, further comprising the step of contacting said metal oxide precursor with a solvent before the step of contacting said metal oxide precursor with a source of organophosphinate anions.

51. (Previously Presented) The process for making a flame retardant polymer composition of claim 50, wherein the step of contacting said metal oxide precursor with a solvent comprises the step of selecting said solvent from the group consisting of water, alcohols, and glycols.

52. (Previously Presented) A process for making a flame retardant polymer composition, the process comprising:

contacting a metal oxide precursor with a source of organophosphinate anions to form a phosphinate-chelated metal oxide precursor;

contacting said phosphinate-chelated metal oxide precursor with a polymer material;

at least partially hydrolyzing said phosphinate-chelated metal oxide precursor to form at least partially hydrolyzed phosphinate-chelated metal oxide precursor monomers;

permitting said at least partially hydrolyzed, phosphinate-chelated metal oxide precursor monomers to polycondense to form a phosphorous-containing metal oxide sol; and

producing a polymer composition comprising a concentration of about 0.5 to about 30 wt% phosphorous-containing metal oxide, the phosphorous-containing metal oxide dispersed throughout the polymer composition in nano-clusters having an average size less than about 1000 nm.

53. (Previously Presented) The process for making a flame retardant polymer composition of Claim 52, wherein the nano-cluster average size is less than about 100 nm.

54. (Previously Presented) The process for making a flame retardant polymer composition of Claim 52, wherein the concentration of phosphorous-containing metal oxide is from about 0.1 to about 10 wt%.

55. (Previously Presented) The process for making a flame retardant polymer composition of Claim 53, wherein the concentration of phosphorous-containing metal oxide is from about 0.1 to about 10 wt%.

56 -59. (Canceled)